

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Rule 71.1)

To:

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08.11.04

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Date of mailing
(day/month/year)

03.11.2004

Applicant's or agent's file reference
FI20021459HJ

IMPORTANT NOTIFICATION

International application No.
PCT/FI 03/00595

International filing date (day/month/year)
07.08.2003

Priority date (day/month/year)
09.08.2002

Applicant

METSO PAPER, INC. et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.
4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 04 NOV 2004

PCT


Applicant's or agent's file reference FI20021459HJ	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/FI 03/00595	International filing date (day/month/year) 07.08.2003	Priority date (day/month/year) 09.08.2002
International Patent Classification (IPC) or both national classification and IPC D21G9/00		
Applicant METSO PAPER, INC. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.
- ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 12 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 11.02.2004	Date of completion of this report 03.11.2004
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Uhlig, R Telephone No. +49 89 2399-7083



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/FI 03/00595

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

4-6, 8 as originally filed
1, 2, 2a, 3, 7 received on 05.10.2004 with letter of 04.10.2004

Claims, Numbers

1-12 received on 05.10.2004 with letter of 04.10.2004

Drawings, Sheets

1/4-4/4 received on 15.09.2003 with letter of 15.09.2003

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/FI 03/00595**

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	3, 5, 9, 11, 12
	No: Claims	1, 2, 4, 6-8, 10
Inventive step (IS)	Yes: Claims	
	No: Claims	1-12
Industrial applicability (IA)	Yes: Claims	1-12
	No: Claims	

2. Citations and explanations

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/FI 03/00595

1. References

1.1 Reference is made to the following documents cited in the international search report:

D1: US-A-5 915 648

D2: DE 199 46 379 A

1.2 The document D3 was not cited in the international search report.

D3: EP-A-0658504

RE Item V

2. Clarity

The set of claims does not appear to be concise. Claim 1 defines that the boundary layer of the tail strip and the reeling drum is removed by means of a suction effect. Given that the air carried by the tail strip belongs to the boundary layer, claim 2, which refers to claim 1, appears to reiterate features of claim 1 (Art. 6 PCT).

3. Independent Claim 1

3.1 The subject-matter of claim 1 - as far as understood - does not appear to be new according to Article 33(1) and (2) PCT.

3.2 In terms of claim 1, D1 can be said to disclose (the references between inclined lines applying to this document)

a method for threading a web in the reeling of a paper or board web, in which method a tail strip (W) of the web is passed into a reeling nip between a reeling drum (10) and a reel spool (12), on which reel spool (12) a web roll is formed, in which method the tail strip (W) of the web is conducted on the surface of the reeling drum (10) by means of suction arranged in the reeling drum (10), in which method the tail strip (W) of the web is passed into the reeling nip between the reeling drum (10) and the reel spool (12) by means of a suction zone (20) which extends around the entire circumference of the reeling drum and which is situated on the surface of the reeling drum (10) in an area where a full width web runs during reeling, so that the tail strip (W) of the web can be conducted directly along the suction zone (20), /col. 5, li. 65 - col. 6, li. 5/

Moreover, D1 col. 6, li. 5 - 12 appears to disclose that the tail strip is put onto the reeling drum by means of a transfer device. No disclosure appears to be made whether the reeling drum is not rotating or rotating at threading speed at this stage. Nevertheless, it is obvious for the skilled person that the reeling drum will initially rotate at threading speed at start up of the reeling part of the paper making machine.

D1, col. 6, li. 11-14 appears to disclose that the suction is strong enough to hold the tail strip in place. Consequently, the turbulences caused by the rotation of the reeling drum and the moving tail strip are insignificant for the functioning of the reeling device. Moreover, given that there is no clear border regarding the extend / height of the boundary layer, the air current due to suction must be considered to extend beyond the boundary layer at threading speed. Thus, D1 appears to implicitly disclose all the features of claim 1.

4. Independent Claim 4

4.1 The subject-matter of claim 4 - as far as understood - does not appear to be new according to Article 33(1) and (2) PCT, respectively at least does not appear to involve an inventive step according to Article 33(1) and (3) PCT.

4.2 In terms of claim 4, D1 can be said to disclose (the references between inclined lines applying to this document)

a reeling device for threading a web in a reeling of a paper or board web /col. 5, li. 64-66/, comprising

a reeling drum (10) /col. 6, li. 1/ and

a reel spool (12) wherein

said reeling drum (10)

is arranged to form a reeling nip with the reel spool (12), /col. 6, li. 1-5/, which reeling drum (10) comprises

suction apertures to provide a /col. 6, li. 8-11 & Fig. 4, ref. 9/ ...,

in which reeling drum (10)

a suction zone (20)

is formed

extends around the entire circumference

placed in a longitudinal direction in an area where the full width web is arranged to run during reeling /col. 5, li. 23-26 & Fig. 4/.

Moreover, D1 col. 6, li. 5 - 12 appears to disclose that the tail strip is put onto the reeling drum by means of a transfer device. This transfer device is interpreted by the examiner as a mechanical means which guides the tail strip through the machine and limits the threading speed to a "low speed" (as disclosed e.g. in D2, Fig. 3). No disclosure is made whether the reeling drum is not rotating or at threading speed at this stage. Nevertheless, it is obvious for the skilled person that at start up of the reeling part of the paper making machine the reeling drum will initially rotate at said "low speed" / threading speed. D1, col. 6, li. 11-14 appears to disclose that the

suction is strong enough to hold the tail strip in place. Given that there is no clear border regarding the extend / height of the boundary layer and given that the turbulences caused by the front edge of the tail strip at said "low speed" are minimal, the air current due to suction will extend beyond the boundary layer at threading speed. Thus, D1 appears to either implicitly disclose all the features of claim 4 (lack of novelty) or the combination of D1 and D2 appears to disclose the features of claim 4 in an obvious manner (lack of an inventive step).

However, considering that according to the knowledge of the examiner threading speed is quite "high" in case threading the tail strip is performed by blowing / suction, the assessment regarding novelty of claim 4 may be different when taking into account the feature of such "high" speed, which however is not part of current claim 4.

5. Dependent Claims

The dependent claims do not appear to contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step, the reasons being as follows:

- Claim 2: see paragraph 2 in combination with paragraph 4.2 of this communication
- Claim 3: D3, Fig. 9, ref. 75 in combination with D1, col. 6, li. 5-8
- Claims 5: D2, col. 1, li. 46, 47
- Claims 6, 7: D1, Fig. 4, ref. 9
- Claims 8, 10: D1, Fig. 1 in combination with col. 3, li. 56, 57 & col. 5, li. 64-66
- Claim 9: It appears to be obvious for a skilled person to balance threading strip lateral guidance variation and bleed air.
- Claims 11, 12: Appear to be obvious alternatives for a skilled person (see e.g. D2, col. 2, li. 11 ,12).

6. Formal/Further Objections

- 6.1 Although claims 1 and 4 are drafted in the two-part form, the features appear to be incorrectly placed in the characterising portion, as they appear to be implicitly disclosed in document D1 in combination with the features placed in the preamble (Rule 6.3(b) PCT).
- 6.2 The independent method claim 1 refers to the boundary layer of the rotating drum and the moving tail strip. However, the independent apparatus claim 4 refers to the boundary layer of the rotating drum or the moving tail strip. Consequently this leads to an objection based on PCT Guidelines 10.14 and 10.16 (unity).

Amended Claims

1. A method for threading a web in the reeling of a paper or board web, in which method a tail strip (W) of the web is passed into a reeling nip between a reeling drum (10) and a reel spool (12), on which reel spool (12) a web roll is formed, in which method the tail strip (W) of the web is conducted on the surface of the reeling drum (10) by means of suction arranged in the reeling drum (10), in which method the tail strip (W) of the web is passed into the reeling nip between the reeling drum (10) and the reel spool (12) by means of a suction zone (20) which extends around the entire circumference of the reeling drum and which is situated on the surface of the reeling drum (10) in an area where a full-width web runs during reeling, so that the tail strip (W) of the web can be conducted directly along the suction zone (20), characterized in that, in the method, a boundary layer (L) produced by the rotating reeling drum (10) and the moving tail strip (W) of the web is removed or reduced so as to be insignificant by means of a suction effect which is provided through the suction zone (20) and which is arranged to extend beyond the boundary layer (L).
2. A method as claimed in claim 1, characterized in that the air carried with the tail strip (W) is also sucked by means of said suction effect.
3. A method as claimed in claim 1 or 2, characterized in that, in the method, the tail strip of the web (W) is conducted to the reeling nip by means of a suction zone (20), which suction zone (20) is situated in the vicinity of one end of the reeling drum (10).
4. A reeling device for threading a web in the reeling of a paper or board web, comprising a reeling drum (10) and a reel spool (12), wherein said reeling drum is arranged to form a reeling nip with the reel spool (12), around which reel spool (12) a web roll is arranged to be formed, which reeling drum (10) comprises suction apertures to provide a suction effect on the surface of the reeling drum

(10), in which reeling drum a suction zone (20) is formed, which suction zone (20) extends around the entire circumference of the reeling drum (10), and which suction zone (20) is placed in the longitudinal direction of the reeling drum (10), i.e. in the width direction of the web, in an area where a full-width web is arranged to run during reeling, characterized in that the suction effect, i.e. a lower static pressure, produced in the suction zone (20) is arranged to extend beyond a boundary layer (L) which is produced because of the rotation of the reeling drum and/or due to the effect of air carried with the tail strip (W).

5 5. A device as claimed in claim 4, characterized in that the reeling drum (10) comprises grooves (21) and that suction apertures (22) of the suction zone are situated at said grooves (21) in said grooves.

15 6. A device as claimed in claim 4 or 9, characterized in that the suction apertures (22) of the suction zone (20) are arranged with close spacing of the holes.

20 7. A device as claimed in any one of claims 4 to 6, characterized in that the distance between the suction apertures of the suction zone (20) in the circumferential direction of the reeling drum (10) is 10-100 mm and the diameter of the suction holes is 1-10 mm.

8. A device as claimed in any one of claims 4 to 7, characterized in that the width of the suction zone (20) is smaller than the width of the web.

25 9. A device as claimed in any one of claims 4 to 8, characterized in that the width of the suction zone (20) is 2 to 4 the width of the tail strip.

10. A device as claimed in any one of claims 4 to 9, characterized in that the suction zone (20) is formed in the vicinity of one end of the reeling drum (10).

30

11. A device as claimed in any one of claims 4 to 10, characterized in that the suction effect of the suction zone (20) is arranged to be provided through a hole situated in the axle of the reeling drum (10), from which hole air is arranged to be transported to a blower (14) along a tube (13) or equivalent.

5

12. A device as claimed in any one of claims 4 to 11, characterized in that the suction effect of the suction zone is arranged to be provided through the end of the reeling drum (10) by means of a separate suction box.

reeling
Method and device for threading a web
in the reeling of a paper or board web

5

The invention relates to a method according to the preamble of claim 1.

reeling
10 The invention also relates to a device according to the preamble of claim 4.

As known in the prior art, in connection with the reeling of a paper web, a reeling drum is used which is provided with suction zones of the sector type, i.e. suction takes place through holes situated in a suction drum shell only in part of the circumference of the drum in the area of a certain sector. One prior-art arrangement in the reeling of a paper web, using a reeling drum provided with a suction zone sector, is disclosed in *FI patent 74446*. In known arrangements in which the suction zone is formed into a sector, it is hardly at all possible to remove the boundary layer air flow produced by the rotating drum. In addition, the suction zone sector in known applications is situated outside the web in the length direction of the drum, i.e. in the width direction of the web, and for this reason during threading it has been necessary to guide the tail strip to the side, i.e. to the zone area, by means of blowing. In many cases, the location of the suction zone sector is also not optimal on the circumference of the drum because the tail strip typically misses the area of the suction sector in the threading operation. If the tail strip misses the suction zone, the tail strip slips out of the machine to the tending side, thus not entering the nip between the reeling drum and the reel spool, i.e. a holding/pulling point. The strip may also be directed towards the middle of the machine and it may slip into the nip from some unpredictable point. This leads to a random amount of loose strip. The tightening of the loose strip lengthens the time taken by threading unnecessarily. In many cases it does not

even succeed, but breaks when it flaps and flutters (English: flap and flutter) into other structures of the machine. After unsuccessful threading attempts, the threading path must be cleared to remove broken tail strips in order that new attempts may be made, which in turn further increases the threading time
5 unnecessarily. The arrangement known from FI patent 74446 is primarily intended to aid reeling in order that the reeling speed might be increased, when needed. This known arrangement does not teach threading of a web.

10 In the arrangements known from the prior art, the holes through which a suction effect is arranged to be produced, are generally placed in the ridges between the grooves of grooved drums.

With respect to the state of the art relating to the threading of a paper web in connection with finishing devices, reference may be made, for example, to FI
15 patent 98742, which discloses a method and an apparatus for threading a paper web on a surface treatment line for paper. In this known arrangement, the paper guide rolls and the surface treatment roll of the surface treatment line are provided with a suction sector and a blow sector, and by using them it is possible to cause the tail strip to adhere reliably to the perforated surface of the roll by means of the
20 suction sector, and by means of suction it is possible to assure the right direction of the draw of the tail strip as well as the guidability of the draw, and formation of an air film between the paper web and the roll is avoided by means of the blow sector, and the tail strip is separated from the roll surface by means of blowing.

[Please insert page 2a]

25 An object of the invention is to create a method and a device for threading a web in connection with the reeling of a paper or board web, in which method and device the drawbacks of the known arrangements described above are eliminated or at least minimized.

2a

5 With respect to the prior art, reference can also be made to *US patent 5,915,648* disclosing a perforated roll for guiding a flexible material web, particular a paper web, which has a jacket and a hollow interior and a respective cover at each end of the jacket. The jacket has a plurality of passage openings for passage of air therethrough, and at least one impeller inside the interior of the roll having a suction side for drawing air into the roll through the passage openings.

A particular object of the invention is to create an arrangement which, when used, enables the tail strip to adhere very well to the reeling drum and ensures that the tail strip is guided to the reeling nip.

- 5 A further object of the invention is to provide an arrangement which enables the tail strip to be positioned in the suction zone of the reeling drum both in the circumferential direction and in the lateral direction.

10 With a view to achieving the objects described above as well as those coming out later, the method according to the invention is mainly characterized in what is set forth in the characterizing part of claim 1.

The device according to the invention is in turn mainly characterized in what is set forth in the characterizing part of claim 6.

15

In accordance with the invention, a suction zone is arranged in connection with a reeling drum, which suction zone extends over the entire circumference of the drum and is located in the area of the web in the width direction of the web, i.e. in the longitudinal direction of the drum, so that the tail strip of the web will also be
20 positioned in the suction zone area also in the lateral direction without a transfer accomplished by means of blowings or the like. The strip is sought to be brought to the holding point as tight as possible (= without looseness).

25 In accordance with an advantageous feature of the arrangement of the invention, the apertures for achieving a suction effect, i.e. suction holes, are arranged at the bottom of the grooves of a grooved drum, most appropriately with close spacing. By this means, the boundary layers produced by the rotating drum and the moving web can be eliminated or reduced so as to be insignificant, with the result that the threading operation takes place reliably.

30

In the schematic partial view of Fig. 2A shown in Fig. 2B, the area A shows that the suction zone 20 comprises grooves 21, i.e. so-called venta grooves, and suction holes 22 through which a suction effect is provided for the suction zone area on the surface of the reeling drum 10. As shown in Fig. 2B, the suction holes 22 are placed at the venta grooves 21.

It is seen in the schematic partial view of Fig. 2C from the area of the suction zone 20 of the reeling drum 10, when the reeling drum 10 forms a nip with the reel spool 12, that the grooves 21 extend to a certain depth from the surface of the reeling drum 10 and the suction apertures, or the suction holes 22, are placed at the grooves 21, which suction holes extend through the shell of the reeling drum 10 to the inside of the shell of the reeling drum 10 to transmit a suction effect to the surface of the reeling drum 10.

Fig. 3A, without boundary layer suction, and Fig. 3B, with boundary layer suction, schematically show in a reel-up a boundary layer L which is formed in the reel-up in the area of the reeling drum 10 and the reel spool 12, which boundary layer is controlled in a threading situation by means of a suction zone in accordance with the invention such that the amount of air sucked through the suction zone exceeds the amount of air carried in the boundary layer L of the drum, thereby assuring a suction effect, i.e. a lower static pressure on the surface of the drum and in its vicinity, so that the tail strip can be brought closer to the drum and caused to adhere to the surface of the drum. The air carried with the tail strip is also sucked by means of the suction effect. In Figs. 3A and 3B, a web guide roll is denoted with the reference numeral 19.

Fig. 4 shows some schematic measurement results relating to a boundary layer produced on a reeling drum in a trial situation in which the speed was 1500 m/min and when a pressure difference was effective over the reeling drum shell and when there was no pressure difference over the reeling drum shell. The curve 31 represents a situation when the pressure difference was 0 and the curve 32

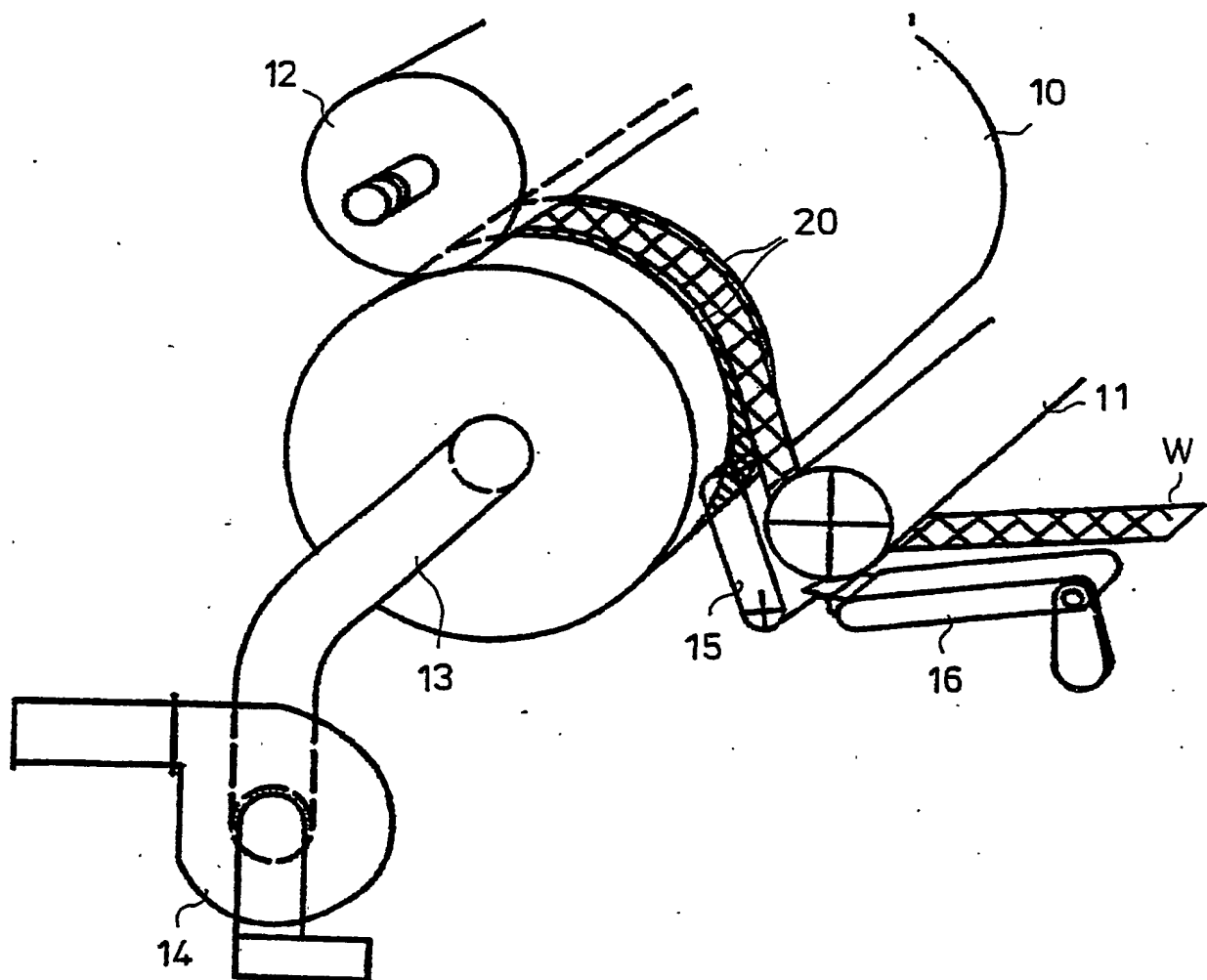


FIG. 1

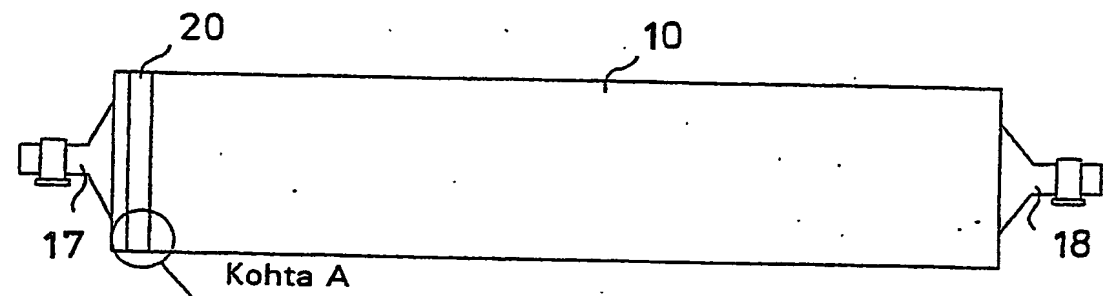


FIG. 2A

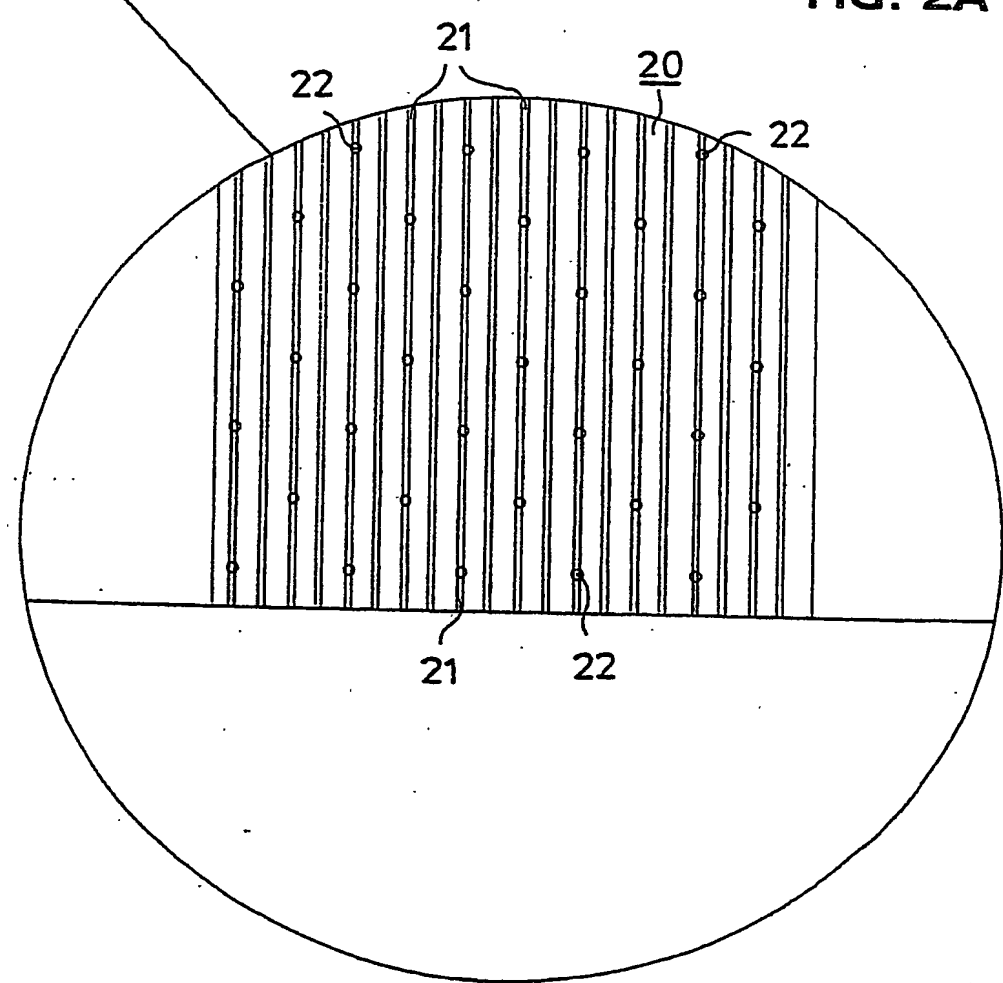
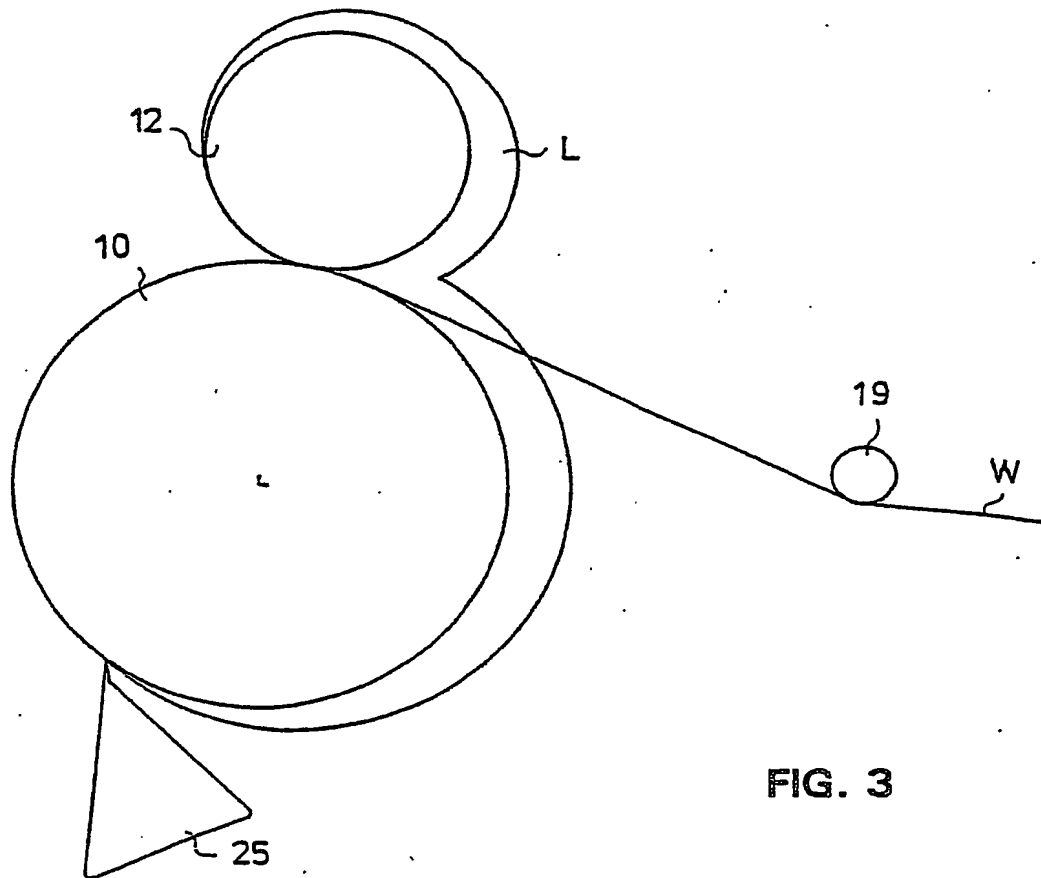
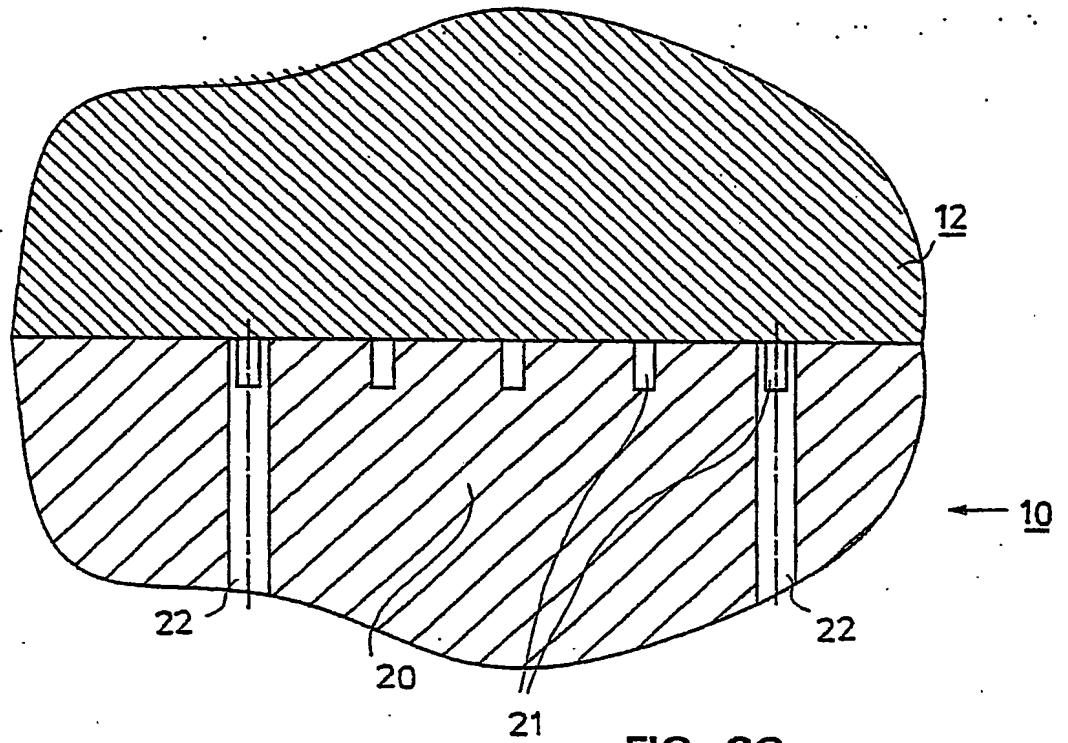


FIG. 2B

3/4



Boundary Layer of Reeling Drum at 1500 m/min (25 m/s) with and without Pressure Difference over the Drum Shell

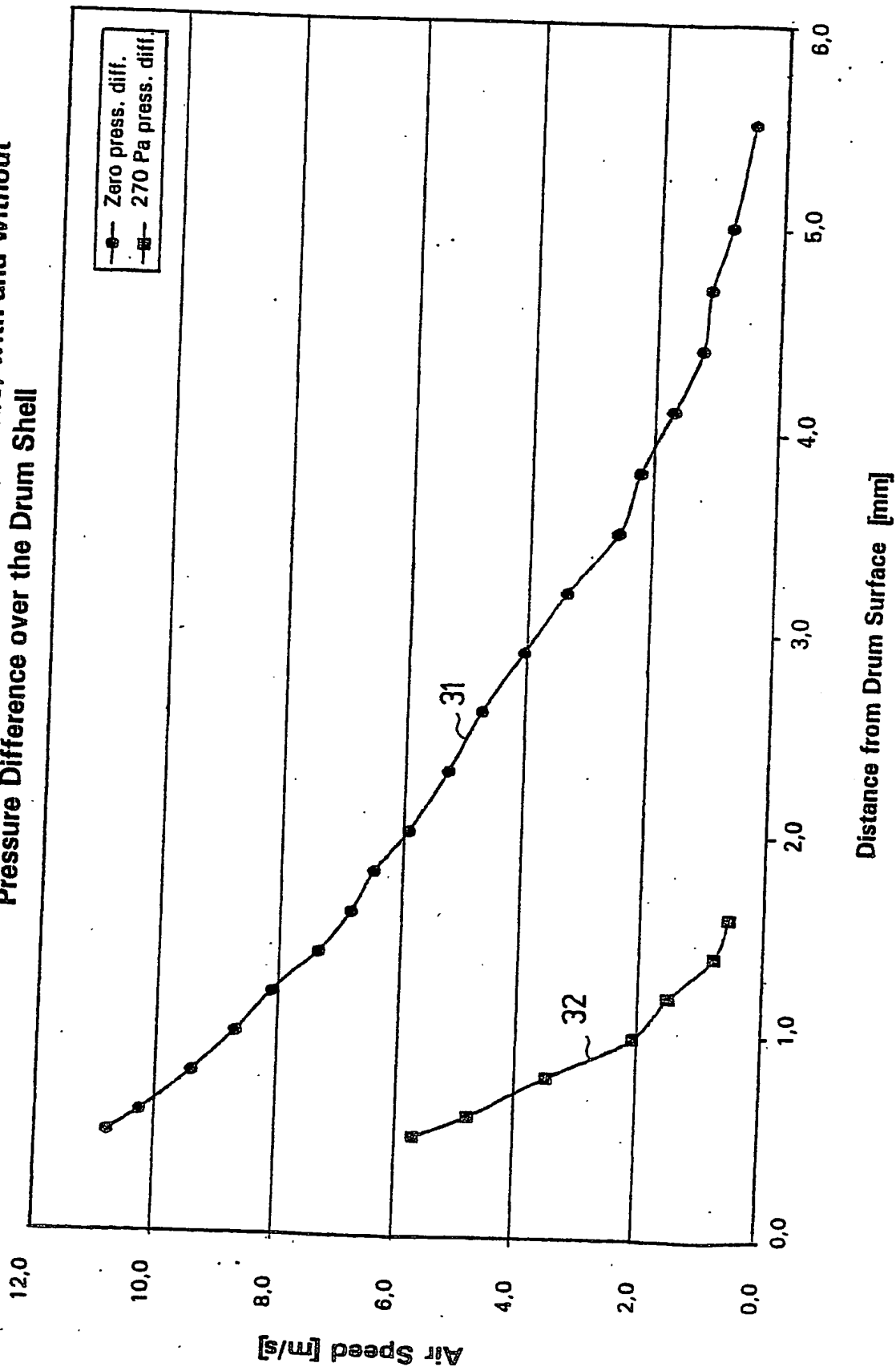


FIG. 4

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